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Effects of Medicinal Plants on Urinary Incontinence: A Systematic Review

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Authors' contributions

This work was carried out in collaboration between both authors. Author MY designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors MY and SHS managed the analyses of the study. Author SHS managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Urinary incontinence is one of the disorders that may develop for various reasons, affect different aspects of life, and declining quality of life.
Relevant key terms were used to retrieve the articles published between 2000 and 2018 and indexed in the *Institute for Scientific Information* and *PubMed*. Then, the articles about the medicinal plants and the plant-based products whose effects were investigated on urinary incontinence (UI) were selected and analyzed by two members of the research team.
Different plants such as *Cannabis sativa*, St. John's wort*, Ephedra sinica*, *Salvia sclarea*, *Ramulus Cinnamomi*, and *Alpinia oxyphylla* exert anti-UI effects through various mechanisms. The phytoestrogen derivatives of the plants mainly in menopausal women, isoflavonoid compounds, Gosha-jinki-gan, and Weng-li-tong, exert anti-UI effects. It should be considered that plants and their derivatives can be used as dietary supplements, independently, and mainly with chemical drugs.

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Plants and plant-based combinations can induce anti-UI effects through phytosterogenic properties in women, decreasing stress and affecting the neuromuscular system as well as decreasing the activities of the detrusor muscle and regulating the activity of the urethral sphincters.

Keywords: Medicinal plant; bladder; urinary incontinence.

1. INTRODUCTION

Urinary incontinence (UI), that refers to the flow of urine contract and involuntarily, is one of the disorders that involve human urinary tract. UI is characterized by lower urinary tract symptoms (LUTS) that can present with impairment of storage or voiding [1]. UI can occur due to various causes. Stress UI [2,3], neurological disorders [4], infection [1], ageing [5,6], prostate diseases, and certain surgeries [7,8] are considered the most important causes of this disorder. In addition to imposing stupendous costs on the community [9], UI complications can adversely affect the quality of life, social relationships, and psychological states [10].

Several chemical treatments and psychotherapies have been suggested for UI [11,12]. However, these treatments remain to help patients return to normal conditions. Complementary therapies and phytotherapies are increasingly being used due to comparatively fewer side effects and lower costs. Medicinal plants can serve as an effective therapy for different diseases including LUTS-associated disorders [13-20]. It seems that because few studies have been conducted on complementary therapies such as acupuncture and phytotherapy, definite arguments cannot be made about them [21]. Therefore, we conducted this review to report the effects of medicinal plants and their derivatives on UI.

2. MATERIALS AND METHODS

In this systematic review, the key words "*urinary incontinence*" in combination with a *medicinal plant*, *herb** and *photo** and EndNote software were used to search for relevant articles from the databases the Institute for Scientific Information (ISI) and PubMed. Then, the plants and the plant-based products that were effective on treatment of UI were selected according to the comments of two colleagues. The articles included in this review were published between 2000 - 2018 and reported the studies with experimental, clinical and cohort design and all age groups. The articles whose full texts were not accessible, non-English full text, and were not related to the purpose of this study were excluded after the authors' agreement was achieved. By using the keywords, 48 studies were found in the PubMed, and 51 articles were found in the ISI database. Finally, considering the inclusion and exclusion criteria, 16 articles were included in this study. Fig. 1 is the flowchart to illustrate how the articles were selected for final analysis.

3. RESULTS

Medicinal plants can serve as therapies for UI through influencing the disorders that lead to UI, such as bladder abnormalities, vertebral dislocation, pregnancy, diuretics, bladder muscle weakness, and surrounding structural diseases such as uterine inflammation, omphalitis, and constipation [22]. These plants can exert their anti-UI effects through different mechanisms (Table 1).

Plant-based derivatives exert therapeutic effects on UI and overactive bladder mainly due to estrogens and through causing hormonal balance in menopausal and postmenopausal women (Table 2).

Also, several compounds and formulations exist to treat UI. A study showed that a combination made up of pumpkin seed oil (65.15%), soybean extract (6.55%) containing 30% isoflavone, and a powder form of *Rubus coreanus* extract (28.30%), helps improve bladder function and ultimately treat UI through increasing the secretion of estrogen in periphery [34]. Ogushi et al. reported that 6-week treatment with Gosha-jinki-gan, a Chinese herbal combination, decreased UI in the elderly with overactive bladder [35]. A capsule called Weng-li-tong was studied for its effects in treating the symptoms of overactive bladder, and found to lead to decrease in these symptoms including UI if used with tolterodine [36].

Dysfunction of different neurotransmitters of the urothelium in response to obstruction and its effect on neuronal receptors can be a potential mechanism of detrusor overactivity and UI [37].

In addition to contributing to the prevention of UI, plants and and natural combinations can also serve as a releasing factor for it. Therefore, certain dietary or plant-based combinations should be consumed cautiously [38]. In some cases, in contrast to public opinion or traditional medicine, some experimental studies have reported that using plants or their derivatives is not associated with an effect on bladder muscles [39,40]. Obviously, the dosage of medicinal plants, the cause of UI, lifestyle, and several other factors can confound research findings.

Besides that, during the menopause and with increasing age of women, morphological changes such as increased degenerative changes in bladder wall including fibrosis and increased connective tissue collagen, oedema, and spaces between the detrusor muscle fascicles and cytoplasmic vacuoles occur that are partly treated by phytoestrogen treatments.

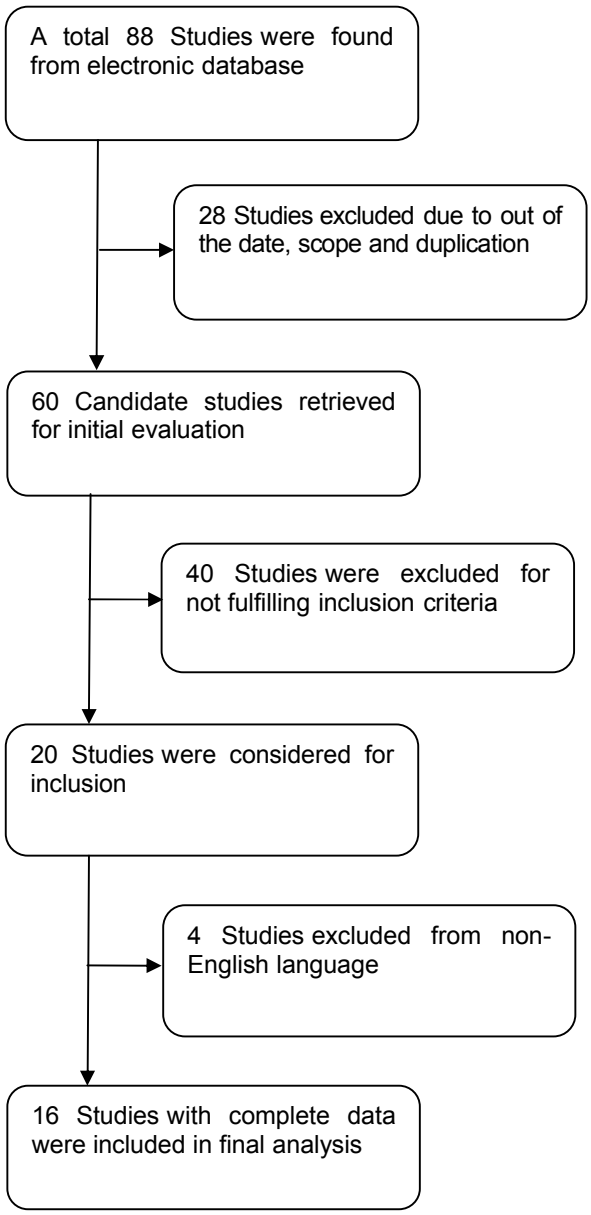

Fig. 1. The flowchart of examining articles according to exclusion and inclusion criteria

Table 1. Medicinal plants effective on UI

Plants	Study Design	Sample size	Use form	Main effects or mechanisms	References
Cannabis sativa	Clinical trial	21 patients	Extracts containing delta-9-tetrahydrocannabinol (THC) and cannabidiol	Effect on receptors in the bladder and nervous system	[23]
St. John's wort	Experimental study	14 rats	Chemical constituents (hyperforin and flavonoid kaempferol)	Inhibiting excitatory transmission (involvement opioid receptors) of the rat urinary bladder and also directly inhibits smooth muscle contractility	[24]
Ephedra sinica	Experimental study	28 rabbits	Extracts	Impact via arachidonic acid metabolites together with alpha(1)-adrenoceptor stimulation and stimulate LTB(4)	[25]
Salvia sclarea	Clinical trial	34 patients	Essential oil	Effect essential oil vapours on autonomic nervous system activity	[26]
Ramulus cinnamomi	Experimental study	20 mice	Extracts containing cinnamaldehyde	Modulation of several SUI-related proteins including myosin, inducible nitric oxide synthase (iNOS), survival motor neuron (SMN) protein, and superoxide dismutase 3 (SOD3)	[27]
Alpinia oxyphylla	Experimental study	Four rat bladder detrusor strips	Extracts containing Izalpinin	Inhibitory role of muscarinic receptor-related detrusor contractile activity.	[28]

Table 2. Phytochemicals effective in urinary incontinence

Phytocompound names	Study design	Sample size	Origin	Main effects or mechanisms	References
Isoflavones, coumestrol, and lignans	Prospective cohort study	1459 patients	Supplement	Prevent stress or urge incontinence	[29]
Equol, puerarin and genistein	Experimental study	60 rats	Soy bean	Can help to improve the urinary closure mechanism	[30]
Genistein	Experimental study	50 rats	Supplement	Regulating bladder muscle receptors (M2 and M3).	[31]
Ginsenoside Rh2	Experimental study	20 rats	*Panax ginseng*	Modulation of several SUI-related proteins, including myosin, SMN, AdR1a, and SOD3,	[32]
Lignan	Cohort study	1789 women	Flax seed	Decrease urge and mixed UI	[33]

But, it is worth mentioning that the effect of phytoestrogens on reducing UI can be influenced by age, dosage, bioavailability, and physical conditions of postmenopausal women [29,31].

4. CONCLUSION

Taken together, experimental and clinical research has shown that plants and plant-based combinations can induce anti-UI effects due to phytosterogenic properties in women, decreasing stress, and affecting the neuromuscular system as well as decreasing the activities of the detrusor muscle and regulating the activity of the detrusor. However, it is recommended to use them with other treatments or as dietary supplements in the long term to exert their best therapeutic effects.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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